SECTION 22 13 01

SANITARY SEWERAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Buried sewer pipe and fittings.

B. Exposed and embedded soil, waste, drain, and vent piping.

C. Valves.

D. Floor drains.

E. Gutter and trench drains.

F. Battery room floor drains.

G. Cleanouts.

H. Piping specialties.

I. Flashings.

J. Escutcheons.

K. Neutralizing sumps.

L. Sewage ejectors.

M. Interceptors and tanks.

1.02 RELATED SECTIONS

A. Site sanitary sewerage system is specified in Section 33 31 00 - Sanitary Utility Sewerage Piping. Coordinate the work of this Section with the work of Section 33 31 00 - Sanitary Utility Sewerage Piping, as required for a complete and finished sanitary sewerage system.

1.03 MEASUREMENT AND PAYMENT

A. Separate measurement or payment will not be made for the work required under this Section. All costs in connection with the Work specified herein will be considered to be included or incidental to the Work of this Contract.

1.04 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A48 Specification for Gray Iron Castings

2. ASTM A74 Specification for Cast Iron soil Pipe and Fittings

3. ASTM D4021 Specification for Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks

4. ASTM C4 Clay Drain Tile

5. ASTM C14 Concrete Sewer, Storm Drain, and Culvert Pipe (ASTM C14M Concrete Sewer, Storm Drain, and Culvert Pipe [Metric]).

6. ASTM C425 Compression Joints for Vitrified Clay Pipe and Fittings.

7. ASTM C443 Joints for Circular Concrete Sewer and Culvert Pip, Using Rubber Gaskets (ASTM C443M – Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets [Metric}.

8. ASTM C564 Rubber Gaskets for Cast iron Soil Pipe and Fittings.

9. ASTM C700 Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

10. ASTM C1053 Borosilicate Glass Pipe and fittings for Drain, Waste, and Vent (DWV) Applications.

11. ASTM D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

12. ASTM D2235 Solvent Cement for Acrylonitrile – Butadiene – Sryrene (ABS) Plastic Pipe and Fittings.

13. ASTM D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

14. ASTM D2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.

15. ASTM D2661 Acrylonitrile – Butadiene – Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.

16. ASTM D2662 Polybutylene (PB) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

17. ASTM D2665 Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

18. ASTM D2666 Polybutylene (PB) Plastic Tubing.

19. ASTM D2683 Socket-Type Polyethylene Fillings for Outside Diameter-Controlled Polyethylene Pipe.

20. ASTM D2729 Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

21. ASTM D2751 Acrylonitrile – Butadiene – Styrene (ABS) Sewer Pipe and Fittings.

22. ASTM D3034 Type PSM Poly (Vinyl Chloride) Sewer Pipe and Fittings.

23. CISPI 301 Coast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems

24. CISPI 310 Joints for Hubless Cast Iron Sanitary Systems.

B. Manufacturer's Standardization Society of Valve and Fitting industry (MSS):

1. MSS SP-70 Cast Iron Valves, Flanged and Threaded Ends

2. MSS SP-80 Bronze Gate, Globe, Angle and Check Valve

C. California Department of Transportation (Caltrans):

Caltrans Bridge Design Specifications, Part 3, Loads

1.05 SUBMITTALS

A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Shop Drawings: Submit Shop Drawings showing piping layouts, sizes, types, valves, drains, cleanouts, sewage structure ejector station, and air compressor assembly.

C. Product Data: Submit manufacturers' product data for specified materials and equipment.

D. Operation and Maintenance Data: Submit equipment manufacturer's printed operating and maintenance instructions in accordance with Section 01 78 23 - Operation and Maintenance Data, consisting of detailed parts list, recommended spare parts list, and complete operation and maintenance procedures.

E. Test Reports: Submit certified test reports of valves and equipment, as applicable.

1.06 SITE CONDITIONS

A. Excavations shall be dry immediately before and after products are installed. Provide surfaces and structures to, and on, which sewerage products will be installed capable of supporting the products. Complete construction, which will be concealed by sewerage products before sewerage products are installed.

B. Coordinate the installation of the sanitary sewerage system with other building systems and components so as to avoid conflicts of installation. Drawings are diagrammatic and not necessarily to scale. Do not scale drawings for exact locations of installation of pipelines, valves, and equipment.

PART 2 - PRODUCTS

2.01 BURIED SEWER PIPE AND FITTINGS

A. Piping below grade shall be Class H as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

B. Piping buried below slabs on grade and piping in the crawl space under platform slabs shall be cast iron sewer pipe, Class B, as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, or ASTM A74 bell-and spigot cast iron sewer pipe with joints made tight and sealed in accordance with Engineer-approved shop details.

C. Ejector pump discharge lines shall be Class H as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

D. Acid waste, drainage, and vent piping shall be Class H pipe and fittings as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

2.02 EXPOSED AND EMBEDDED SOIL, WASTE, DRAIN, AND VENT PIPING

A. Provide Class B cast iron soil pipe and fittings as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for non-pressure piping.

B. Provide Class E copper tube as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC s, for HVAC condensate pan drain.

C. Provide Class C steel pipe and fittings as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for ejector pump discharge.

2.03 VALVES

A. General: Provide valves of types indicated.

B. Gate and Check Valves: Refer to Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for gate valves and swing check valves.

C. Backwater Valves: Provide backwater valves with cast iron bodies, hinged flaps, and seats, bolted covers, bronze trim, and flaps and seats removable through covers. Disc shall allow leakage, which will eliminate blocking of the valve by the bridging of solids on the upstream side. Flaps shall be sensitive to backflow, and capable of closing immediately upon backflow.

D. Trap Primer Unit: Provide automatic trap primer valve, copper or cast bronze, 150 psi operating pressure, solder joint ends, with internal air gap, in-line type, complete with distribution unit.

2.04 FLOOR DRAINS

A. Provide floor drains manufactured of heavy cast iron with double drainage flange, sediment bucket, integral seepage pan, trap primer connection, and clamping collar for waterproofing membrane.

B. Provide heel proof strainer of chromium-plated cast brass, polished brass or buff polished nickel alloy, as indicated, sized to match floor drain and attached to a bronze threaded collar for adjustment to varying floor thickness.

C. Provide cast-iron extra heavy traffic pattern floor drains where indicated.

2.05 GUTTER AND TRENCH DRAINS

A. Provide gutter and trench drains manufactured of heavy cast iron with sediment bucket, integral anchor flange and flashing clamp where membrane is provided. Provide cast iron, extra heavy traffic pattern gutter trench drains, where indicated. Provide cast ductile iron anti-tilt grate unless otherwise indicated.

1. Coordinate with the requirements for trench drains specified in Section 05 50 00 - Metal Fabrications.

2.06 BATTERY ROOM FLOOR DRAIN

A. Cast iron body with acid resistant enameled interior and enamel coated dome strainer, bottom outlet with aperture joint to suit PVC pipe connection, heavy-duty, round flange flashing collar with weepholes.

2.07 CLEANOUTS

A. Provide cleanouts of cast iron conforming to ASTM A48, Class 25B and of sizes indicated.

B. Floor cleanouts shall be adjustable type, and shall have scoriated nickel alloy cover and, if for membrane waterproofed floors, a clamping device.

C. Wall cleanouts shall be bolted wedge type having a cover. Cover shall be satin stainless steel in flanged frame secured to plug with a vandal-proof screw.

D. Exposed cleanouts shall have raised brass head cleanout plug.

E. Grade cleanouts shall have adjustable sleeve-type housing, threaded brass plug with countersunk slot, and cast iron frame and cover.

2.08 PIPING SPECIALTIES

A. Gaskets for flanged joints shall be as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

B. Couplings for connecting above ground and underground piping shall be specifically designed for the purpose required with transition type gaskets.

2.09 FLASHINGS

A. Provide either soft-tempered or cold-rolled copper, weighing not less than 16 ounces per square foot, or sheet lead, weighing not less than four pounds per square foot.

2.10 ESCUTCHEONS

A. Provide as specified in Section 20 20 13 - Pipe Sleeves, Supports and Anchors for Facility Services

2.11 NEUTRALIZING SUMPS

A. Provide sump molded in one piece from polyethylene with NPT connections and having minimum capacity of 15 gallons or 1.33 cubic feet of usable volume.

B. The sump shall be completely filled with marble chips, and furnished complete with gasketed, bolted polyethylene cover.

2.12 SEWAGE EJECTOR

A. Provide in accordance with Section 22 14 29 - Sump Pumps.

2.13 INTERCEPTORS AND TANKS

A. Interceptors:

1. Interceptors shall be of epoxy-coated, cathodic-protected, steel of double wall construction with hydrostatic or dry well leak detector in annulus or waterproofed concrete with minimum of two compartments. Provide three 24-inch minimum diameter manholes with removable covers designed for Caltrans H 20 traffic loads.

2. Provide floating type light oil and fuel skimmer in each interceptor with gravity drain to waste oil tank; 3 inches diameter minimum; 1/2 inch per foot slope. Skimmer buoyancy shall be adjustable to allow skimming 0.90 to 0.94 specific gravity floating material.

3. The manholes shall be located at interceptor ends for access to each compartment and centered over compartment partition for access to skimmer. Provide a plumbing vent terminating minimum of 10 feet above grade for each interceptor.

4. The leak detector for double wall steel interceptors shall be located in the Mechanical or Electrical Room, as applicable, and a leak alarm shall be transmitted to Central as indicated on the Contract Drawings.

B. Tanks:

1. Tanks shall be of glass fiber-reinforced polyester plastic conforming with ASTM D4021. Tanks shall be equipped with 22 inches minimum inside diameter manway with bolted and gasketed cover, 36 inches minimum diameter by 36 inches minimum high compartment above, and 24 inches diameter heavy duty traffic pattern manhole cover at grade.

2. Tanks shall be furnished complete with 2 inches vent, terminating a minimum 10 feet above grade; 3 inches capped pump out connection with spill containment box with traffic pattern cover at grade, and level gage with remote dial indicator and high level alarm installed in the Mechanical or Electrical Room, as applicable. Tanks shall be of double wall construction with hydrostatic type leak detector or enclosed in concrete vault with floor mounted moisture type detector.

3. The leak detection panel, level gage, and high level alarm shall be located in the Mechanical or Electrical Room, as applicable, and alarms shall be transmitted to Central as indicated on the Contract Drawings.

PART 3 - EXECUTION

3.01 PREPARATION

A. Excavations shall be free of water and extraneous material immediately before sanitary sewerage products are installed or placed. Bottoms of trenches shall have a 6 inch sand bed and shall be formed to support the bottom quadrant of the pipe and fittings. Should rock be encountered or should bedding material be unsuitable to support the products at indicated elevation, continue excavation to an elevation 8 inches below the indicated elevation and backfill with clean sand to the indicated elevation.

B. Interior of pipe, pipe fittings, valves, drains, and cleanouts shall be cleaned of dirt and foreign substances before installation.

C. Install sleeves through walls, floors, roofs, and other structures before sewerage lines are installed. Piping shall not be installed under walls, foundations, or footings. Invert of sleeves shall be minimum 6 inches above the bottom of footings and foundations.

3.02 INSTALLATION

A. Excavating and backfilling, including bedding and compacting requirements, shall conform to Section 33 05 28 - Trenching and Backfilling for Utilities.

B. Install products where indicated. Remove and reinstall products that are disturbed after installation. Ends of products to which future connections will be made shall be valved, plugged, or capped, and anchored.

C. Connections to existing facilities shall be made with fittings and short bends to suit the actual conditions; connect products in accordance with the product manufacturer's printed installation instructions.

D. Pipe and fittings shall be set true to line and grade before joints are made up. Angular deflections of joints shall not exceed the recommendations of the pipe and fitting manufacturer. Should the alignment require deflection of joints to be in excess of those recommended, use special bends to achieve the indicated deflection. Pipe ends and joints shall be prepared in accordance with the manufacturer's recommendations. As a minimum pipe ends shall be sanded and cleaned, fittings shall be cleaned, and solvent shall be applied to both pipe and fittings.

E. Slope horizontal soil and waste pipes a minimum 2% downward in direction of flow. Extend main vertical soil and waste stacks full size to the roof-line and above as vents, except where otherwise specifically indicated. Run vent pipes in roof spaces as close as possible to the underside of the roof without forming traps in pipe, using fittings as required. If a circuit vent pipe from fixture, or line of fixtures, will be connected to a vent line serving other fixtures, the connection shall be at least 6 inches above the flood- level of the highest fixture served. Grade and connect vent and branch-vent pipes to drip back to the vertical stack by gravity. Support all above grade piping in accordance with 15065, Pipe Sleeves, Supports, and Anchors.

F. Install wall sleeves and seals in accordance with 15065, Pipe Sleeves, Supports, and Anchors. Sealing members shall be installed so as to provide electrical isolation between the metallic carrier pipe and all metallic components of the sleeve and seal.

G. Make changes in pipe size on soil, waste, and drain lines with reducing fittings. Changes in direction shall be with either 45-degree wyes long or short-sweep 1/4, 1/6, 1/8 or 1/16 bends, or elbows.

H. Slip joints will be permitted only in fixture trap seals on the inlet side of the traps.

I. Installation of pipe and fittings shall comply with the manufacturers' recommendations. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted.

J. Joints in no hub cast iron soil pipe and fittings shall use double-seal, compression-type molded neoprene gasket, which shall provide a positive seal.

K. Tighten band and screw assemblies used in conjunction with hubless type cast iron pipe to 60-inch pounds torque on each band screw, with a torque wrench specifically designed for the purpose.

L. Provide escutcheons at all finished surfaces where exposed piping, bare or insulated, passes through floors, walls, and ceilings. Fasten escutcheons to pipe or pipe covering.

M. Equip each fixture and piece of equipment connecting to the sanitary sewer system with a drain trap located as near fixture as possible, and no fixture shall be double-trapped.

N. Provide acid-proof piping in locations indicated. Install acid-proof piping separate from other waste piping, and connect to neutralizing sump, then to other sanitary piping only at mains.

O. Drains:

1. Floor drain rim elevation shall be located such that uniform slope of 1-1/2 percent is maintained from the furthest distance at the perimeter of slab to rim. There shall be no local depression.

2. Unless otherwise indicated, floor, shower, and trench drains connected to sanitary sewers shall be trapped.

3. All below grade traps in public restrooms shall be provided with trap primers.

4. Maintain integrity of waterproof membranes where penetrated by installing flashing collar or flange so that no leakage occurs between drain and adjoining materials.

5. Position drains and neutralizing sumps so that they are readily accessible and easy to maintain.

P. Provide access panels in accordance with Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

Q. Interceptor and Tank Installation: Manhole covers shall be set with frame in reinforced concrete collar 48 inches minimum wide by 6 inches thick with No. 4 reinforcement 12 inches each way

and finished flush with grade. Storage tanks shall be installed with antiflotation slab and tie downs in accordance with the manufacturer's instructions. Interceptors shall be installed on redwood sleepers or antiflotation slab in accordance manufacturer's instructions. Both storage tanks and interceptors shall have compacted pea gravel backfill installed to grade in accordance with the manufacturer's instructions.

3.03 PIPE CLEANOUTS

A. Cleanouts shall be the same size as the pipe up to and including 4 inches; for 6 inch and larger pipe, cleanouts shall be 4-inch minimum. Cleanouts for drainage pipe shall consist of a longsweep 1/4 bend or one or two 1/8 bends extended to the place indicated. Wall or accessible piping cleanouts shall be T-pattern, 90-degree branch drainage fittings having screw plugs. Cleanouts shall be provided at the base of each riser and shall consist of a wye pattern fitting with a screw plug.

3.04 IDENTIFICATION

A. Identification shall be as specified in Section 20 40 13 - Identification for Facility Services.

3.05 FIELD QUALITY CONTROL

A. Do not cover products to be buried and do not paint products or line segments to be painted until those products have been inspected, tested, and accepted.

B. Test installed sewerage lines and equipment, with the Engineer in attendance, as follows:

1. Fill gravity sewers and soil pipe with water and allow to stand for not less than 30 minutes without leaking; low and intermediate branches shall have been temporarily sealed. Provide test tees having cast iron screwed plugs in the vertical stacks if the sewers and soil pipe are to be tested in sections. Accomplish testing of interior lines before lines are concealed. Repair leaks and retest systems until the system exhibits no leaks. Head of water shall be not less than 5 feet, and shall not exceed 10 feet.

2. Disconnect force mains from equipment, seal open ends, and fill mains with water, and hydrostatically test to a pressure of 50 psi greater than the normal pumping pressure. Maintain test pressure until the force main system has been examined for leaks. Repair leaks and retest system until no leaks are exhibited. Use testing instruments calibrated by a qualified laboratory in accordance with Section 01 45 00 - Quality Control.

3. Test equipment by operation and adjustment of controls. Faulty equipment or controls shall be either repaired or replaced.

3.06 PAINTING

A. Except where indicated, piping systems shall not be painted. Where pipes are indicated to be painted, as exposed piping in finished rooms, prepare pipe and paint in accordance with Section 09 91 00 - Painting.

3.07 CLEANING

A. Cleaning of installed products shall consist of removing dirt and foreign material from the surfaces of products. Manufacturer's labels shall remain intact. Rust stained products shall either be replaced or recoated with paint, which is compatible with factory-applied coating.

3.08 REPAIR

A. Repair pipe coatings, which have become damaged during installation of pipe. Rust stained cast iron pipe and fittings shall either be replaced or recoated with paint, which is compatible with factory-applied coating.

END OF SECTION 22 13 01